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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,544	11/26/2003	Koichi Kondo	245936US2SRD	5702

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EXAMINER	
SHARON, AYAL I	
ART UNIT	**PAPER NUMBER**
2123	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/721,544	KONDO, KOICHI	
	Examiner	Art Unit	
	Ayal I. Sharon	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/26/2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/24/04, 4/26/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1-18 of U.S. Application 10/721,544 filed on 11/26/2003 are currently pending.
2. The application claims benefit of Japanese Application 2002-344228 filed on 11/27/2002.

Information Disclosure Statement

3. Reference AX in the IDS filed 2/24/04, and references AW, AX, and AY of the IDS filed on 4/26/04 lack publication dates. This does not conform to the requirements set forth in 37 CFR 1.98(b)(5). The references have not been considered.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. **Claims 1-18 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.**
6. The claims are directed to simulating a behavior of a mechanism using a hybrid model including a state transition model and a continuous system model. This claimed subject matter lacks a practical application of a judicial exception (law of

nature, abstract idea, naturally occurring article/phenomenon) since it fails to produce a useful, concrete and tangible result.

7. The claimed subject matter does not produce a useful or tangible result:
   a. A useful result is missing because the claimed subject matter fails to sufficiently reflect at least one practical utility set forth in the descriptive portion of the specification. More specifically, while the described practical utility is directed to "easily and accurately model[ing] a complicated mechanism system" (see specification, para. [0012], the claimed subject matter relates ONLY to "representing the behavior of a system."
   b. A tangible result is missing because the claimed subject matter fails to produce a result that is limited to having real world value rather than a result that may be interpreted to be abstract in nature as, for example, a thought, a computation, or manipulated data. More specifically, the claimed subject matter provides for "outputting data." This produced result remains in the abstract and, thus, fails to achieve the required status of having real world value.
8. **Claims 1-18 are also rejected under 35 U.S.C. 101 because the claimed invention preempts a 35 U.S.C. 101 judicial exception.**
9. One may not patent every "substantial practical application" of an idea, law of nature or natural phenomena because such a patent "in practical effect be a patent on the [idea, law of nature or natural phenomena] itself." Gottschalk v. Benson, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972).

10. "Thus, a claim that recites a computer that solely calculates a mathematical formula (see Benson) or a computer disk that solely stores a mathematical formula is not directed to the type of subject matter eligible for patent protection." See also MPEP § 2106 (C)(3).

11. All of the claims in the instant application share this defect. In particular, none of the independent claims 1, 5, 6, 7, 11, 12, 13, 17 or 18 are restricted to any field of application, and therefore the claims are directed to all possible applications of the math recited in the claims.

12. Some of the dependent claims are restricted to certain fields of application (e.g., claim 3 recites a mechanism control software, and claim 4 recites kinematics simulation), yet even these areas are very broad (e.g., a control software could be used to regulate chemical, mechanical, electrical processes, etc.), and thus are "in practical effect be a patent on the [idea, law of nature or natural phenomena] itself."

13. For example, the Mosterman reference cited by the Applicant in the IDS filed 2/24/04 teaches the uses of a similar mathematical algorithm for modeling (1) a falling rod (see p.169), and (2) and evaporator vessel (see p.171), two physical phenomena which otherwise bear no relation to one another.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. The prior art used for these rejections is as follows:

16. Mosterman, P.J. and G. Biswas. "A Comprehensive Methodology for Building Hybrid Models of Physical Systems." Artificial Intelligence. © 2000. Vol.121, pp.171-209. (Hereinafter "**Mosterman**").

17. Claims 1-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Mosterman.

18. In regards to Claim 1, Mosterman teaches the following limitations:

1. A simulation method of simulating a behavior of a mechanism using a hybrid model including a state transition model and a continuous system model, the method comprising:

analyzing the hybrid model to extract a first description data of a state transition model and a second description data of a continuous system model;

(See Mosterman, especially: Section 6, "A Computational Architecture" on pp.193-194)

generating a table representing a relationship between continuous system equations and switching conditions thereof, based on the extracted first description data;

(See Mosterman, especially: pp.202-204, and Tables 1 and 2 on p.203)

generating a plurality of internal data expressions of the continuous system equations, based on the extracted second description data;

(See Mosterman, especially: pp.202-204, and Figures 18-19)

selecting an active continuous system equation by looking up the table according to an occurrence of an event; and

(See Mosterman, especially: pp.202-204, and Figures 18-19)

outputting data that represents the behavior of the mechanism by solving the selected active continuous system equation by numerical integration using one or more of the internal data expressions that corresponds to the selected active one or more continuous system equations.

(See Mosterman, especially: pp.202-204, and Figures 18-19)

19. In regards to Claim 2, Mosterman teaches the following limitations:

2. The method according to claim 1, further comprising: switching the active one of the continuous system equations to the another continuous system equation by operating a flag assured for each of the continuous system equations.

(See Mosterman, especially: Section 6, "A Computational Architecture" on pp.193-194, which teaches "allowing the cODE system of equations to be replaced by a set of simpler ODEs"; and pp.202-204, and Figures 18-19)

20. In regards to Claim 3, Mosterman teaches the following limitations:

3. The method according to claim 1, wherein the event is responsive to one of a control signal and an evaluation result of an internal variable, the control signal being provided from an external process including mechanism control software that controls the mechanism.

(See Mosterman, especially: p.195, which teaches that "Σ" can be "external control signals")

21. In regards to Claim 4, Mosterman teaches the following limitations:

4. The method according to claim 1, further comprising executing a kinematics simulation which uses the data that represents the behavior of the mechanism.

(See Mosterman, especially: pp.202-204, and Figures 18-19)

22. In regards to Claim 5, Mosterman teaches the following limitations:

5. A simulation method of simulating a behavior of a mechanism using a hybrid model including a state transition model and a continuous system model, the method comprising:

analyzing the hybrid model to extract a first description data of a state transition model and a second description data of a continuous system model;

(See Mosterman, especially: Section 6, "A Computational Architecture" on pp.193-194)

generating a table representing a relationship between continuous system equations and switching conditions thereof, based on the extracted first description data;

(See Mosterman, especially: pp.202-204, and Tables 1 and 2 on p.203)

generating a plurality of internal data expressions of the continuous system equations, based on the extracted second description data; and

(See Mosterman, especially: pp.202-204, and Figures 18-19)

performing a simulation of the behavior of the mechanism while referring to the table and the plurality of internal data expressions or the continuous system equations.

(See Mosterman, especially: pp.202-204, and Figures 18-19)

23. In regards to Claim 6, Mosterman teaches the following limitations:

6. A simulation method of simulating a behavior of a mechanism using a hybrid model including a state transition model and a continuous system model, the method comprising:

analyzing the hybrid model to extract a first description data of a state transition model and a second description data of a continuous system model;

(See Mosterman, especially: Section 6, "A Computational Architecture" on pp.193-194)

generating a first program code based on the extracted first description data;

(See Mosterman, especially: pp.202-204, and Tables 1 and 2 on p.203)

generating a second program code based on the extracted second description data;

(See Mosterman, especially: pp.202-204, and Figures 18-19)

generating a plurality of internal data expressions of the continuous system equations by executing the second program;

(See Mosterman, especially: pp.202-204, and Figures 18-19)

switching continuous system equations according to switching conditions thereof by executing the first program; and

(See Mosterman, especially: pp.202-204, and Figures 18-19)

outputting data that represents the behavior of the mechanism by solving the continuous system equations by numerical integration using the internal data expressions.

(See Mosterman, especially: pp.202-204, and Figures 18-19)

24. In regards to Claim 7, Mosterman teaches the following limitations:

7. A simulation apparatus which simulates a behavior of a mechanism using a hybrid model including a state transition model and a continuous system model, comprising:

an analyzing unit configured to analyze the hybrid model to extract a first description data of a state transition model and a second description data of a continuous system model;

(See Mosterman, especially: Section 6, "A Computational Architecture" on pp.193-194)

a first generating unit configured to generate a table representing a relationship between continuous system equations and switching conditions thereof, based on the extracted first description data;

(See Mosterman, especially: pp.202-204, and Tables 1 and 2 on p.203)

a second generating unit configured to generate a plurality of internal data expressions of the

continuous system equations, based on the extracted second description data; and

(See Mosterman, especially: pp.202-204, and Figures 18-19)

a simulation execution unit configured-to: select an active continuous system equation by looking up the table according to an occurrence of an event; and

(See Mosterman, especially: pp.202-204, and Figures 18-19)

output data that represents the behavior of the mechanism by solving the selected active continuous system equation by numerical integration using one or more of the internal data expressions that corresponds to the selected active one or more continuous system equations.

(See Mosterman, especially: pp.202-204, and Figures 18-19)

25. In regards to Claim 8, Mosterman teaches the following limitations:

8. The apparatus according to claim 7, wherein the simulation execution unit switches an active one of the continuous system equations to another continuous system equation by operating a flag assured for each of the continuous system equations.

(See Mosterman, especially: Section 6, "A Computational Architecture" on pp.193-194, which teaches "allowing the cODE system of equations to be replaced by a set of simpler ODEs"; and pp.202-204, and Figures 18-19)

26. In regards to Claim 9, Mosterman teaches the following limitations:

9. The apparatus according to claim 7, wherein the event is responsive to one of a control signal and an evaluation result of an internal variable, the control signal being provided from an external process including mechanism control software that controls the mechanism.

(See Mosterman, especially: p.195, which teaches that "Σ" can be "external control signals")

27. In regards to Claim 10, Mosterman teaches the following limitations:

10. The apparatus according to claim 7, further comprising a kinematics simulation execution unit configured to execute a kinematics simulation which uses the data that represents the behavior of the mechanism.

(See Mosterman, especially: pp.202-204, and Figures 18-19)

28. In regards to Claim 11, Mosterman teaches the following limitations:

11. A simulation apparatus which simulates a behavior of a mechanism using a hybrid model including a state transition model and a continuous system model, comprising:

an analyzing unit configured to analyze the hybrid model to extract a first description data of a state transition model and a second description data of a continuous system model; .

(See Mosterman, especially: Section 6, "A Computational Architecture" on pp.193-194)

a first generating unit configured to generate a table representing a relationship between continuous system equations and switching conditions thereof, based on the extracted first description data;

(See Mosterman, especially: pp.202-204, and Tables 1 and 2 on p.203)

a second generating unit configured to generate a plurality of internal data expressions of the continuous system equations, based on the extracted second description data; and

(See Mosterman, especially: pp.202-204, and Figures 18-19)

a simulation execution unit configured to execute a simulation of the behavior of the mechanism, while referring to the table and the plurality of internal data expressions of the continuous system equations.

(See Mosterman, especially: pp.202-204, and Figures 18-19)

29. In regards to Claim 12, Mosterman teaches the following limitations:

12. A simulation apparatus which simulates a behavior of a mechanism using a hybrid model including a state transition model and a continuous system model, comprising:

an analyzing unit configured to analyze the hybrid model to extract a first description data of a state transition model and a second description data of a continuous system model;

(See Mosterman, especially: Section 6, "A Computational Architecture" on pp.193-194)

a first generating unit configured to generate a first program code based on the extracted first description data;

(See Mosterman, especially: pp.202-204, and Tables 1 and 2 on p.203)

a second generating unit configured to generate a second program code based on the extracted second description data;

(See Mosterman, especially: pp.202-204, and Figures 18-19)

a third generating unit configured to generate a plurality of internal data expressions of the continuous system equations by executing the second program;

(See Mosterman, especially: pp.202-204, and Figures 18-19)

a switching unit configured to switch continuous system equations according to switching conditions thereof by executing the first program; and

(See Mosterman, especially: pp.202-204, and Figures 18-19)

an outputting unit configured to output data that

represents the behavior of the mechanism by solving the continuous system equations by numerical integration using the internal data expressions.

(See Mosterman, especially: pp.202-204, and Figures 18-19)

30. **Claims 13-18 are rejected based on the same reasoning as claims 1-6. Claims 13-18 are computer program claims that recite limitations equivalent to those recited in method claims 1-6 and taught throughout Mosterman.**

Conclusion

31. The following prior art, made of record and not relied upon, is considered pertinent to applicant's disclosure.

32. Kondo, K. "Use of Hybrid Models for Testing and Debugging Control Software for Electromechanical Systems." IEEE/ASME Transactions on Mechatronics. June 2005, Vol.10, No.3, pp.275-284. (Does not qualify as prior art due to the publication date).

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a bi-week, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753.

Any response to this office action should be faxed to (571) 273-8300, or mailed to:

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon
Art Unit 2123
December 29, 2006

1/4/07
PAUL RODRIGUEZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100